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December 6, 2002

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Dear Examiner Rao:

We respectfully request the scheduling of a telephone conference with you and your SPE, Mr. Olik Chaudhuri, sometime early next week if possible. Pursuant to your request for a detailed explanation on our request for a telephone conference, below are issues we would like to discuss with you and Mr. Chaudhuri at the telephone conference:

35 USC §112, First Paragraph:

Claims 17 and 19, added in our Amendment of July 5, 2002, stand rejected for the specific reasons set forth in the last full paragraph on page 2 of the outstanding Action. More particularly, the outstanding Action has taken the position that the recitation that each of the claimed source region is "annular," as set forth in each of claims 17 and 19 is not described in the applicants' specification, as originally filed.

In response, we submit that, as clearly noted in line 10, page 14 of the applicants' original specification (and as originally shown in the applicants' Figures 1 and 2), the applicants' Figure 2 is described as a sectional view taken along the cross-sectional line A-A in the applicants' Figure 1, the applicants' Figure 1 showing six cells 3₁ through 3₆, each being in a rectangular configuration. In addition, as noted in lines 22 - 25, page 27 of the applicants' specification, as originally filed, each of the cells 3₁ through 3₆ need not be limited to a rectangular configuration, but can take the shape of "for example, circular cells." As such, the claimed source regions being annular are supported in the applicants' specification, as originally filed.

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35 USC §112, Second Paragraph:

Claims 16 - 19 stand rejected under 35 USC §112, second paragraph, for the specific reasons set forth in the first through third full paragraphs on page 3 of the outstanding Action.

First, we believe that independent claim 16 should include the following recitation: "and a conductive region of a second conductive type" in order to be consistent with the claimed semiconductor substrate recited in each of independent claims 1, 11 and 18.

Please see our proposed claim amendments to independent claim 16 as attached herewith.

Secondly, we disagree with the comments set forth in the outstanding Action that independent claim 18 fails to further limit independent claim 11. Here, we submit that the following structural limitations, which are absent in independent claim 11, are found in independent claim 18:

wherein the transistor comprises a plurality of said source regions and outer periphery of each said source regions is exposed at a side of upper part of said trench.

35 USC §103:

As to the merits of this case, a new reference (namely, Sapp, U.S. Patent No. 6,351,018) is relied upon in rejecting claims 1 - 11 under 35 USC §103(a) based on Baliga (of record) in view of Sapp.

First, the outstanding Action specifically relies on the teachings of the secondary reference of Sapp in order to supplement the deficiencies in the teachings of the primary reference of Baliga in failing to "specifically state or describe a bottom part being in contact with an upper part of said drain layer."¹ More particularly, the outstanding Action sets forth that:

Sapp in fig. 2 and col. 2 lines 33-45 describes a bottom part of the insulating layer being in contact with upper part of drain region (col. 2 line 43-45) to provide isolation [trenches] that allow large anode contact area that connects to the trench MOSFET source terminal thus resulting in better devices.²

¹ Please see, lines 3 and 4, page 5 of the outstanding Action.

² Please see, lines 5-8, page 5 of the outstanding Action.

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We note, however, that in the last Amendment filed for this case, the following structural arrangements were highlighted in independent claims 1 and 11:

a source electrode film provided in contact with said source region exposed at least on the side surface of said trench and electrically insulated from said gate electrode material.

As further argued in support of such claimed structural arrangements in each of independent claims 1 and 11, significant structural arrangements of the applicants' power MOSFET 1 include the source electrode film 29 and the source region 27 in each cell 3 being in direct contact with each other on: (1) a top surface 51 of the semiconductor substrate 5, and (2) an inner circumferential surface 52 of the trench 18, and are electrically connected to each other.

Consequently, the area of the source regions 27 exposed on the inner side surface 52 of the trench 18 can be increased; thereby, increasing the contact area between the source regions 27 and the source electrode film 29. By doing so, there is no need to increase the size of the source regions 27 along the substrate top surface 51; thereby, reducing the area occupied by the source regions, and the size of the device.³

However, there is nothing in the outstanding Action's specific reliance on either the Baliga or Sapp reference that discusses the above-discussed significant claimed structural arrangements, set forth in each of independent claims 1 and 11 (and in previously added independent claims 16 and 18).

Secondly, the outstanding Action responds to the applicants' arguments, set forth in the July 5, 2002 Amendment, in the following manner:

[Applicants] argue that Baliga is not concerned with the increase in the contact area between a source region and a source electrode film by increasing the area of the source region exposed on the inner circumferential or side surface of the trench.

It is noted that the above limitation is not recited in any of the pending claims and is therefore not given patentable weight.⁴

³ As described in, for example, line 22, page 20 through line 14, page 21 of the applicants' specification, as originally filed.

⁴ Please see, lines 15-19, page 6 of the outstanding Action. Also, please see, lines 11-14, page 8 of our July 5, 2002 Amendment.

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Emphasis added. Contrary to the Action's rebuttal argument, it is clear that each of independent claims 1, 11, 16 and 18 specifically recites the following limitations:

a source electrode film provided in contact with said source region exposed at least on the side surface of said trench and electrically insulated from said gate electrode material.

As discussed above, the paragraph bridging pages 7 and 8 of the applicants' July 5, 2002 Amendment explains that such claimed structural arrangement increases the contact area between the source regions 27 and the source electrode film 29 without increasing the size of the source regions 27 along the substrate top surface 51; thereby, reducing the area occupied by the source regions and the size of the device.

CONCLUSION

Based on the above and proposed claim amendments, we respectfully request the scheduling of a telephone conference with you and Mr. Olik Chaudhuri.

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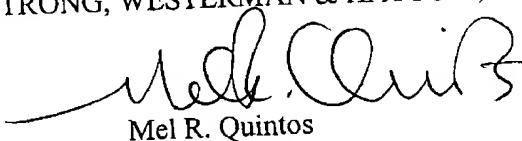
We would appreciate receiving your approval on such request for a telephone conference.

If you have any questions, please feel free to let us know.

With best regards,

Very truly yours,

ARMSTRONG, WESTERMAN & HATTORI, LLP



Mel R. Quintos

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Enclosures: Proposed Claim Amendments

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